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ABSTRACT

Social returns and the annual and long-term economic impact of higher education on the state of Maryland are assessed. Long-term impacts of colleges on economic growth include human capital formation, increased earnings of graduates, and provision of a trained labor force. Quantifiable economic impacts of higher education for fiscal year 1985 include these facts: colleges, students, faculty, staff, and their visitors spent $1.71 billion in Maryland, and from this spending, additional spending of $2.05 billion was induced; the total monetary economic impact of higher education was over eight times the state's investment (direct state appropriations); and higher education employed over 63,000 individuals, and was responsible for the employment of 120,000 additional people. Also of note is the fact that more education is linked to greater employment rates and higher salaries, as well as to payment of larger taxes. Finally, universities' research activities are important in attracting and keeping diverse industries in the state. A list of participating institutions is included, along with information on the derivation of an economic impact model and the methodology for estimating short-term economic impact. (SW)

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Higher Education's Monetary
and Non-Monetary Impact
on Maryland's Economy

February, 1987

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FOREWORD

The State Board for Higher Education has prepared this report on the monetary and non-monetary impact of higher education on the economy of the State of Maryland as a part of its continuing efforts to provide current data on higher education. This report provides information on the quantifiable economic impact of the Maryland institutions of higher education, the long-term impacts, and the social returns to the State.

We are grateful for the cooperation and assistance provided by the segments of higher education in Maryland, the Maryland Department of Economic and Community Development, the Maryland Department of Budget and Fiscal Planning, and the Maryland Department of State Planning.

Dr. Mary McKeown of the Division of Finance and Facilities had primary responsibility for this report.

Sheldon H. Knorr
Commissioner

Executive Summary

Higher education has short-term and long-term impacts on the economy of the State of Maryland and provides social returns to the State. The directly quantifiable economic impact of the institutions of higher education as industries is massive, contributing at least $3.776 billion to Maryland's economy in FY 1985, an amount that represents about 6 percent of the gross state product.

* Higher education institutions, students, faculty, staff and their visitors spent $1.71 billion in Maryland in FY 1985.

* From this spending, additional spending of $2.05 billion was induced.

* The State of Maryland provided $468.5 million in direct State Appropriations to support higher education. The total monetary economic impact of higher education was over eight times the State's investment.

* Total economic activity related to higher education was about equal to total State General Fund expenditures in FY 1985.

The functions of institutions of higher education as trainers of highly skilled talent, producers of new knowledge, and contributors to Maryland's cultural life can be measured only

indirectly. However, the conclusion is inescapable that higher education's intangible benefits are even more important economically than the measurable monetary benefits.

Maryland's economy cannot function without highly trained persons and without continued technological innovations. Higher education is a major source of the talent and innovation needed by those industries that are growing most rapidly in Maryland. At the same time, Maryland's colleges and universities cannot function without a strong economy to support and provide the resources needed for research, instruction, and public service. Thus, higher education must work with businesses and industries in Maryland, and in the surrounding areas, to develop mutually beneficial programs that will sustain and encourage economic growth and continued benefits for the State's citizens.

* Higher education, one of Maryland's largest businesses,employed in FY 1985 over 63,000 individuals, and is responsible for the employment of 120,000 additional people, 10 percent of the State's labor force.

* Higher education accounts for over $4 billion in financial assets, including endowments, retirement programs, and buildings and equipment.

* Persons with more education are more likely to be employed. In 1985, 15.9 percent of those with less than a high

school diploma were unemployed, while only 2.6 percent of those with four or more years of college were unemployed.

Higher education develops individuals that are better leaders, more able to handle ambiguity and stress, more tolerant of diversity, more adaptable to change, have better work habits, are more reliable, and more aware of social responsibilities. Individuals who complete postsecondary education have lower rates of unemployment, and are less likely to commit crimes. Lifetime earnings of individuals who have attended institutions of higher education tend to be higher than those of less educated individuals. Thus, individuals who have had the benefits of higher education return to the State the cost of their education in increased taxes.

* More education leads to increases in salaries. In 1982, a male with less than 8 years of schooling earned, on the average, $7,208 while a college graduate earned $24,630, over three times that of his less-educated counterpart.

* Over their lifetimes, a woman college graduate earns one and one-half times the amount earned by a woman without a high school diploma.

* As a result of additional incomes, individuals who are better educated pay more taxes. A man with a bachelor's degree is likely to pay almost $70,000 more in taxes over his lifetime than a high school graduate.

* A male bachelor's degree recipient repays more than six times the cost of education to the State in additional taxes.

The institutions of higher education engage in many research activities that pay large economic dividends by attracting and keeping diverse industries in the State. Industrial researchers have been trained by universities at which they were exposed to basic research problems and faculty with broad experiences who enabled the development and refinement of research skills. Basic research from colleges and universities led to the discovery of DNA and RNA, and in turn led to the development of many beneficial pharmaceuticals. In the social sciences, natural sciences, and the humanities, basic research conducted at colleges and universities has resulted in a better understanding of human beings and the world. Maryland's attractiveness to high tech industries can be attributed in great part to the availability of highly trained individuals and of nearby university research facilities.

Howard Bowen summarized the benefits of higher education this way: "First, the monetary returns from higher education alone are probably sufficient to offset all the costs. Second, the nonmonetary returns are several times as valuable as the monetary returns. And third, the total returns from higher education in all its aspects exceed the cost by several times. In short, the cumulative evidence leaves no doubt that American higher education is well worth what it costs." (Bowen 1977).

A strong relationship exists between economic prosperity and educational expenditures. Resources devoted to the institutions of higher education in Maryland over the last 200 hundred years have paid enormous dividends to the State of Maryland and its citizens. Investments in higher education are a large part of the reasons why Maryland has a productive and growing economy.

Higher Education's Monetary and Non-monetary Impact On Maryland's Economy

Since the 17th century, the State of Maryland has fostered the development of higher education. Support has taken several forms, including exemption from taxation, direct monetary support for ongoing operations and for facilities, and management assistance from State officials and agencies. Over the last two centuries, many questions have been raised concerning the appropriate level of support for higher education and the impact of higher education upon Maryland's economy.

Prior to the Civil War, Calcott observed that, "The state had failed to create public schools or colleges because the upper classes resolutely opposed taxation to educate the masses in elementary schools, and equally resolutely the lower classes opposed taxation to educate the few in colleges." (Moos, 1981). In the 1870s and 1880s, the Maryland Farmer and the State's only newspaper expressed misgivings about the idea of state support for higher education.

During the past year, several national reports have drawn attention to higher education. Questions have been asked about reductions in the benefits of higher education, its place among social priorities, the size and cost of the enterprise, and its value in providing opportunities for upward mobility.

This report attempts to answer some of those questions by demonstrating the importance of higher education to Maryland and by indicating that the return on the State's investment is high. First, the report will demonstrate quantitatively the short-term economic impact of Maryland's institutions of higher education on the State. The methodology and assumptions used in economic impact studies will be outlined and previous economic impact studies summarized. Then, long-term economic impact will be addressed by highlighting the human capital formation aspects of higher education and the social benefits of higher education to the State will be discussed.

Background Information

The State of Maryland has a long history of higher education. St. John's College was founded in 1696, one of the first institutions in the colonies; Washington College opened its doors in 1782. In 1784, St. John's College and Washington College were joined to form the first "University of Maryland," with a single board of trustees and the Governor as Chancellor. The University began receiving State support that year, becoming what Malcolm Moos called "the first state university in the United States." Maryland was the home of one-tenth of the colleges in the United States at the end of the Revolutionary War.

Maryland institutions of higher education include the first college of dentistry in the world, one of the first law schools, the third college of agriculture, the fourth college of pharmacy, the sixth medical school, the first research-oriented private university, and some of the first Catholic colleges. Before the Civil War, Marylanders had built 23 colleges, seven of which survive.

Today higher education in Maryland has three segments that provide opportunities for higher education to the citizens of the State: the public four-year colleges and universities, the

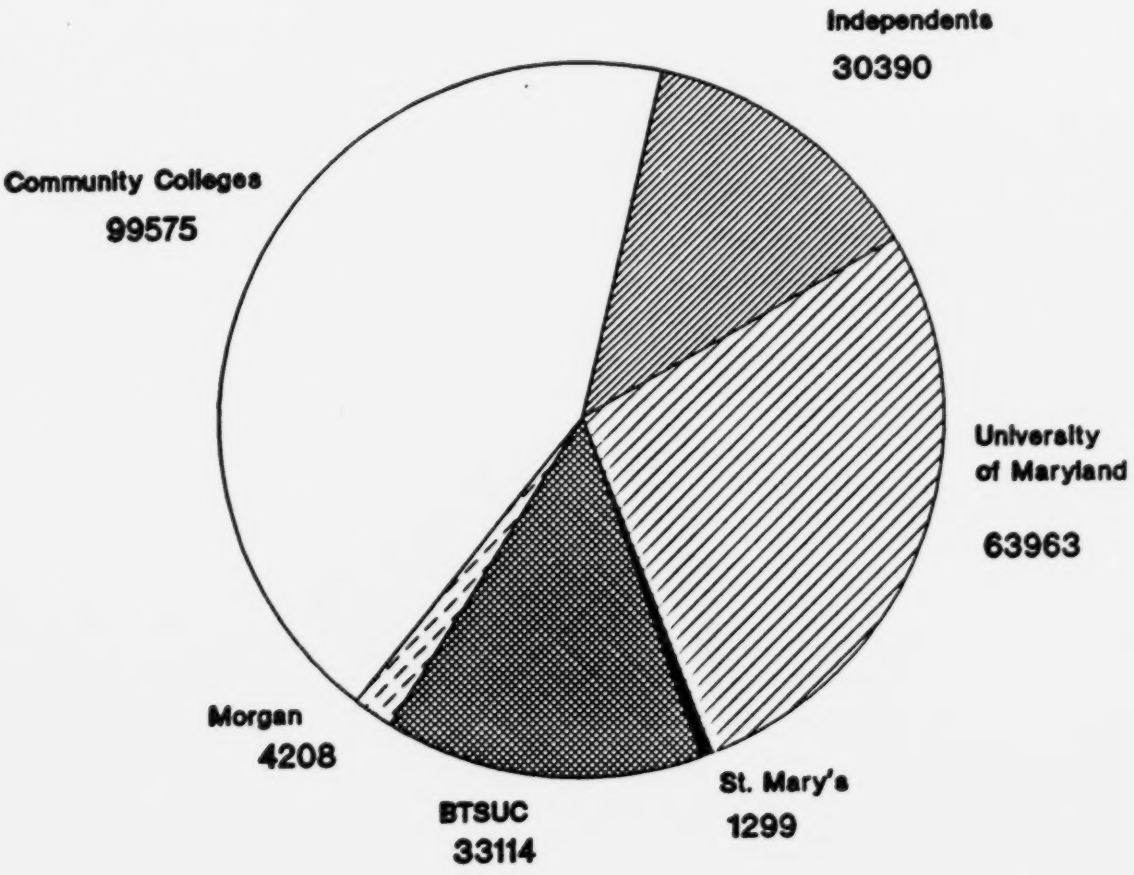
independent institutions of higher education, and the public community colleges. During FY 1986, the institutions of higher education in Maryland enrolled over 500,000 of the State's 4.4 million residents. More than 100,000 of these students were enrolled full-time, and 123,000 were enrolled part-time in Credit Courses during Fall, 1985. (See Figure 1.)

The public four-year college and university segment is composed of the University of Maryland, the six institutions governed by the Board of Trustees of the State Universities and Colleges, St. Mary's College of Maryland, and Morgan State University. The University of Maryland has five teaching campuses which enrolled 63,963 headcount students during the academic year 1985, an Agricultural Experiment Station, a Cooperative Extension Service, and a Center for Environmental and Estuarine Studies. The University's public service activities reached more than 150,000 Maryland residents during FY 1985.

The six state colleges and universities governed by the Board of Trustees of the State Universities and Colleges (Bowie State College, Coppin State College, Frostburg State College, Salisbury State College, Towson State University, and the University of Baltimore) enrolled 33,114 students in FY 1985. St. Mary's College enrolled 1,299 students and Morgan State University enrolled 4,208. Maryland's 17 community colleges enrolled 99,575 students in classes for credit and 265,000 students in continuing education courses. The 14 independent state-aided institutions of higher education in Maryland enrolled 30,390 students in 1985.

FIGURE 1

FY 1985 CREDIT ENROLLMENT
MARYLAND INSTITUTIONS OF HIGHER EDUCATION



SOURCE: EIS.

During FY 1985, Maryland's institutions of higher education expended $1.837 billion, of which $569.4 million was for goods and services and $1.267 billion was for wages and salaries. Not included in this total were the expenditures for the University of Maryland Medical System or for the Johns Hopkins University Hospitals. (See Table 1.) This level of expenditures places higher education among the major industries of the State.

The State of Maryland provided $468.5 million in direct state appropriations to support these expenditures. Revenues to finance higher education were derived from a variety of sources, including State, local, and Federal governments, student tuition and fees, gifts, and sales of activities related to the college or university. In FY 1985, 24.2 percent of all revenues were derived from state appropriations and 20.1 percent from tuition and fees.

Higher education also accounts for approximately $4 billion in financial assets. Institutional endowments total over $500 million and current and prior employees of higher education institutions have over $1 billion vested in retirement programs. The estimated current replacement cost of college and university buildings, laboratories, and equipment on Maryland's college and university campuses was estimated to be $2.9 billion at June 30, 1985. Clearly, higher education represents a major investment for Maryland and its citizens.

TABLE 1

FY 1985 REVENUES AND EXPENDITURES
MARYLAND INSTITUTIONS OF HIGHER EDUCATION

	FOUR-YEAR PUBLIC	TWO-YEAR PUBLIC	INDEPENDENT INSTITUTIONS	TOTAL
REVENUES:				
TUITION AND FEES	$ 181,385,582	$ 57,318,619	$ 143,139,204	$ 381,843,405
FEDERAL APPROPRIATION	0	0	0	0
STATE APPROPRIATION	366,745,311	80,688,934	13,063,570	460,497,815
LOCAL APPROPRIATION	0	68,945,749	0	68,945,749
FED. GRANTS AND CONTRACTS	112,463,195	21,758,640	139,200,513	273,422,348
STATE GRANTS AND CONTRACTS	23,162,574	4,304,184	4,547,613	32,014,371
LOCAL GRANTS AND CONTRACTS	1,623,195	161,721	1,520,000	3,304,916
PRIVATE GIFTS, GRANTS	19,136,126	2,052,397	95,908,621	117,097,144
ENDOWMENT INCOME	1,072,674	0	29,773,817	30,846,491
EDUCATIONAL SALES & SERVICES	19,709,395	6,168	784,124	20,499,687
AUXILIARY ENTERPRISES	100,813,385	12,520,694	41,932,996	155,267,075
HOSPITALS	0	0	0	0
OTHER SOURCES	9,813,504	3,907,902	90,424,883	104,146,289
INDEPENDENT OPERATIONS	0	1,750,490	253,268,424	255,018,914
TOTAL CURRENT FUNDS REVENUES	$ 835,924,941	$ 253,415,498	$ 813,563,765	$ 1,902,904,204
EXPENDITURES:				
INSTRUCTION	$ 284,751,147	$ 109,192,996	$ 223,525,711	$ 617,469,854
RESEARCH	88,329,687	14,268	87,776,516	176,120,471
PUBLIC SERVICE	24,701,428	4,099,383	789,132	29,589,943
ACADEMIC SUPPORT	46,418,822	15,273,909	22,813,207	84,505,938
STUDENT SERVICES	39,005,989	21,363,114	17,525,203	77,894,306
INSTITUTIONAL SUPPORT	76,019,984	41,399,415	55,343,514	172,762,913
PLANT	73,633,336	27,803,903	39,166,961	140,604,200
SCHOLARSHIPS AND FELLOWSHIPS	38,420,337	16,335,825	43,326,387	98,082,549
MANDATORY TRANSFERS	2,130,185	350,008	3,816,434	6,296,627
TOTAL ED & GENERAL	$ 673,410,915	$ 235,832,821	$ 494,083,065	$ 1,403,326,801
AUXILIARY	99,639,416	11,469,552	39,844,399	150,953,367
HOSPITALS	26,528,569	0	0	26,528,569
INDEPENDENT OPERATIONS	0	1,758,485	254,087,305	255,845,790
TOTAL CURRENT EXPENDITURES	$ 799,578,900	$ 249,060,858	$ 788,014,769	$ 1,836,654,527

NOTE: The State also appropriated $8 million to the State Scholarship Board for financial aid.

METHODOLOGY FOR ESTIMATING SHORT-TERM ECONOMIC IMPACT

To determine the short-term economic impact of the institutions of higher education on the economy of Maryland, an analysis was made of the flows of higher education expenditures, based on the model developed by John Caffrey and Herbert Isaacs for the American Council on Education, "Estimating the Impact of A College or University on the Local Economy." An explanation of the model developed by Caffrey and Isaacs is contained in Appendix A.

The base for the economic impacts is a factor known as the "expenditure multiplier." The concept of the expenditure multiplier is based on the economic principle of exchange, which holds that when money is spent for some purpose, it does not simply disappear. Part of the money remains in the community to be spent and spent again. The portion of the money that is removed from the immediate area may leave in the form of taxes, purchases outside the area, or by any of a number of other means. However, in most cases, several exchanges of money are involved before it vanishes from the local area. For example, if half of a dollar leaves the community in the first transaction, and half at each following transaction, seven transactions will take place before the value drops below one cent. All of these transactions taken together will generate another dollar of economic activity in the community. This 50 percent "retention rate" produces an

expenditure multiplier of 2.00 - each dollar spent generates another dollar to be spent in the community. (CPEC 1984).

In their study Caffrey and Isaacs developed expenditure multipliers that varied from 1.2 to 2.3, depending on the locality in which the college or university was located. For a small college located in a semi-rural area close to a large military base, the expenditure multiplier was only 1.2 because approximately 80 percent of expenditures were "non-local." For an institution in Los Angeles, California, the multiplier was calculated to be 2.2, implying that about 55 percent of a dollar was retained in the local area. Other estimates of the economic multiplier have varied from 1.09 for the University of Pittsburgh to 4.35 for the University of Alabama. (See Table 2.)

For the purposes of this study, a retention rate of 55 percent was used, yielding an expenditure multiplier of 2.2. This estimate of the multiplier was used because the majority of economic impact studies have multipliers around this level and previous studies of the economic impact of Maryland colleges and universities -- a 1978 study of the community colleges and a 1980 study of Johns Hopkins University -- derived multipliers of 2.0. Since this study deals with all of the institutions in the State, a multiplier in excess of that used by a specific institution or set of institutions in a state is reasonable since more expenditures will be "local", i.e., occur within the State. Thus, the multiplier used in this study was evaluated to be a conservative, but empirically sound, estimate of the economic impact.

Table 2

Summary of Previous Economic Impact Studies

Year	Institution or State	Multiplier Derived
1967	Husson College	2.0
1968	University of Colorado	1.37
1970	University of Florida	1.40
1970	Wisconsin State University	2.0 - 2.3
1971	University of Alabama	4.35
1971	Eastern Kentucky University	1.75
1971	Caffrey-Isaacs: Claremont Colleges	1.2 - 3.0
1972	University of Pittsburgh	2.0
1973	Kent State University	1.09
1973	New Hampshire	1.55
1975	Kansas City area community colleges	2.7
1976	Georgia State University	1.22 - 1.78
1978	Georgia State University	1.48
1978	New York independent colleges	2.0
1978	Mohalk Valley Community College	1.8
1978	Maryland community colleges	2.0
1978	Allegany Community College	1.3
1980	Louisiana	1.72
1980	Johns Hopkins University	2.01
1980	St. Cloud State University	2.0 - 2.2
1980	Six Illinois community colleges	2.5 - 3.6
1981	Pennsylvania	1.69
1981	Long Beach City College	2.27
1982	Arizona universities	3.37
1984	University of Georgia	1.58
1984	California:	
	California State University	2.43
	University of California	2.78
	Community colleges	2.50
	Independent colleges	2.78
1986	New York	1.703

Sources: Caffrey and Isaacs (1971); Salley (1977); California Postsecondary Education Commission (1984); Van Pattee (1973); Lyall and Montoya (1981)

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TOTAL ANNUAL ECONOMIC IMPACT OF MARYLAND HIGHER EDUCATION

Maryland's institutions of higher education spent $1.837 billion in FY 1985 to pay salaries and operating expenses to provide instructional programs, research projects, and activities.

From an investment of $468.5 million by the State, economic activity totalling $3.766 billion was generated. This total in direct economic impact is over eight times the State's investment. Higher education accounts for 6.0 percent of the gross state product of $62 billion, and the economic activity generated was about equal to the total State General Fund of $3.772 billion.

In addition to the direct spending by institutions, it was estimated that students spent $655 million in Maryland. Students spent this money on books, travel, and living expenses. This money is in addition to expenditures by students for residence and dining halls, and would not have been spent without the existence of higher education institutions. Campuses attract, for various events, visitors and others who spent an estimated $45.5 million.

Figure 2 summarizes the impact of the institutions of higher education in Maryland on the economy of the State. The institutions spent $1.27 billion for salaries to employees, who

in turn spent $698.5 million on local purchases. The institutions also spent $313 million on local purchases; students spent $655 million, and visitors spent $45.5 million. The direct economic benefit of these purchases and salaries was $1.71 billion. From this spending, additional spending of $2.05 billion was induced, yielding a total economic impact of $3.766 billion in FY 1985. (See Table 3 and Figure 2.)

This total spending resulted in more than 120,000 jobs being attributable to higher education.

The economic benefit of higher education must be weighed against the cost to the State. The State spent $486.6 million in direct State appropriations to higher education, about $20 million for debt service for higher education facilities and sacrificed approximately $21 million from exemptions to property, income, and sales taxes. In addition, local governments spent $68.9 million in direct support of community colleges and gave up more than $1 million in local property and income tax receipts.

In addition, State and local governments have to provide services to the employees of the higher education institutions. These include educating the children of the employees, police protection, garbage collection, etc. These costs are assumed to be offset by increases in property values resulting from the presence of the institutions of higher education in the area.

FIGURE 2

ECONOMIC IMPACT

1985

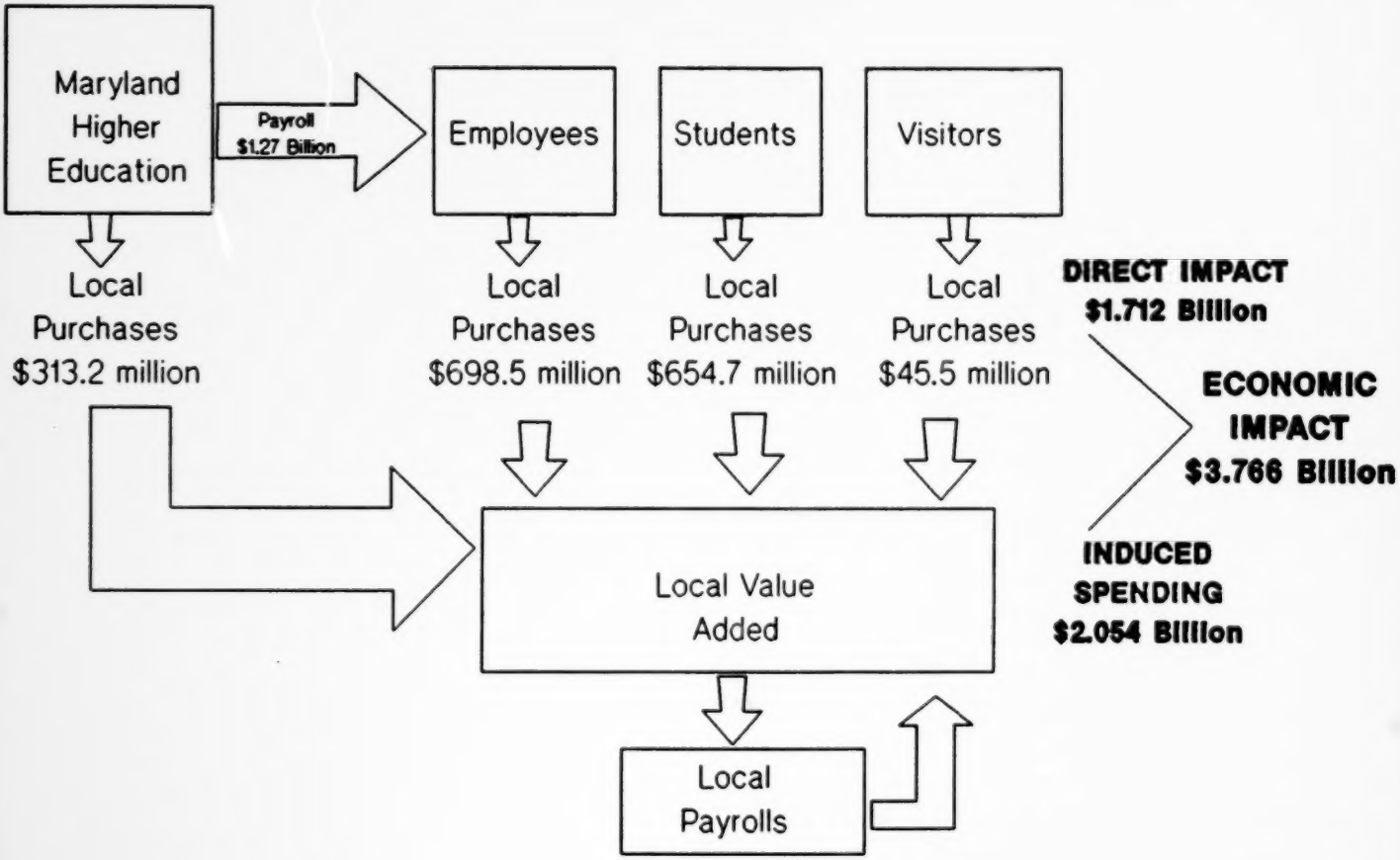

Table 3

Economic Impact of Maryland's Colleges and Universities, 1984-85

(Dollars in Millions)

Source	Direct Expenditures	Added Impact of Multiplier	Total Economic Impact
Institutional	$ 313.2	$ 375.8	$ 689.0
Faculty & Staff	698.5	838.2	1,536.7
Students	654.7	785.6	1,440.3
Visitors	45.5	54.6	100.1
Total	$1,711.9	$2,054.2	$3,766.1

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Long-Term Economic Impact

The benefits of higher education, of course, include non-monetary benefits to the State and its citizens.

The long-term economic impact of higher education on a state may be more significant than the short-term impact.

SOCIAL RETURNS TO EDUCATION

With increases in educational attainment, voting rates are increased; a person with greater education has less chance of being in prison, of being in poverty, and of being unemployed. An educated population is a prerequisite for a democratic society. (Weisbrod 1962).

Education contributes to economic growth in at least three ways: additions to the quantity of productive resources, improvement in the quality of resources, and more effective utilization of resources. That education increases the quantity of productive resources can be shown by examining the labor force participation or employment rate. Education is associated with the labor force participation rate; as more years of education are obtained, labor force participation rate, in general, increases. (See Table 4 and Figure 3.) In 1985, only 2.6 percent of individuals with four or more years of college were unemployed, compared to 15.9 percent of those with less than a

Table 4

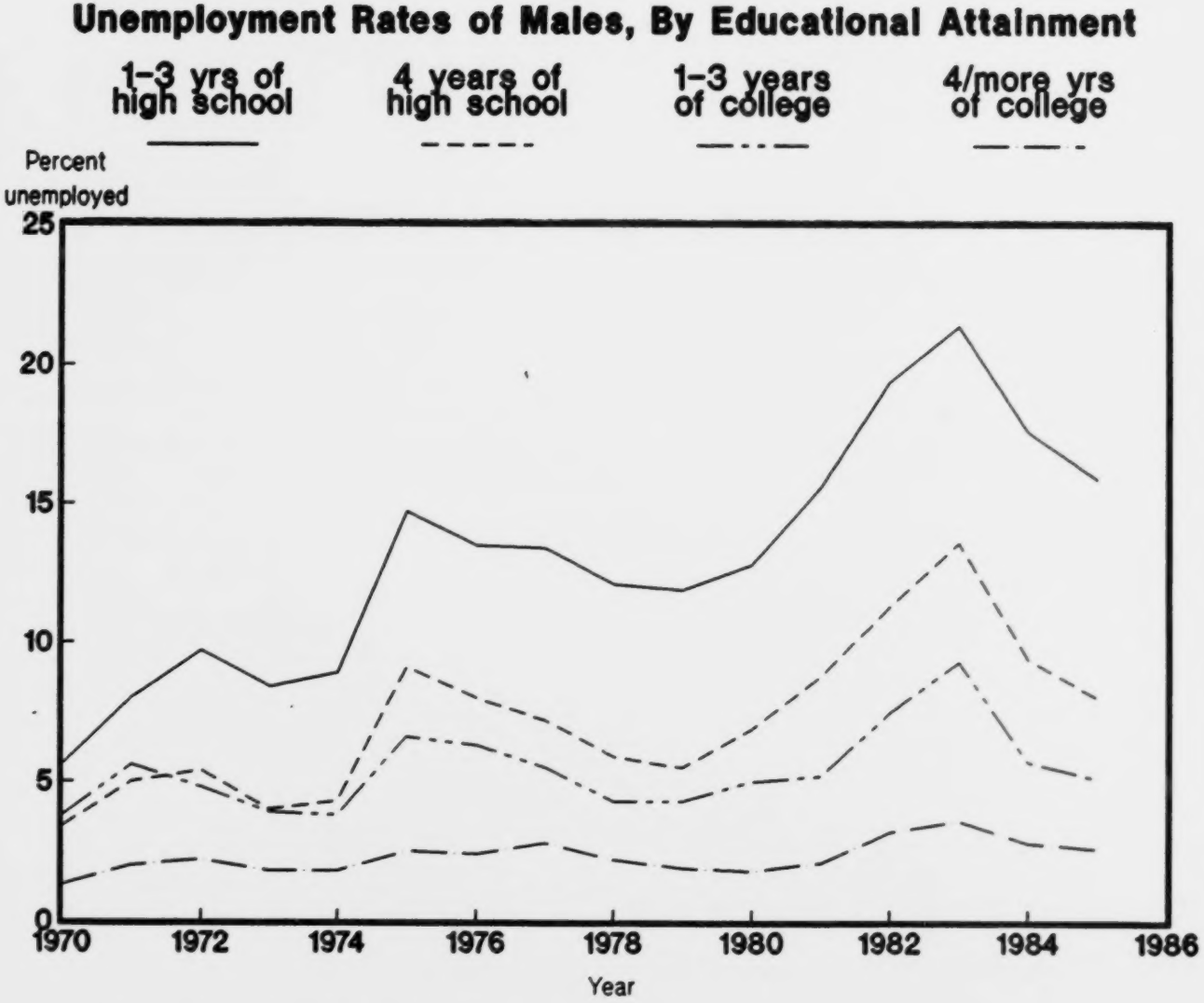
Unemployment Rates for Males
by Educational Attainment

Year	High school education		College education	
	1-3 years	4 years	1-3 years	4 or more years
1970	5.60	3.40	3.80	1.30
1971	8.00	5.00	5.60	2.00
1972	9.70	5.40	4.80	2.20
1973	8.40	4.00	3.90	1.80
1974	8.90	4.30	3.80	1.80
1975	14.70	9.10	6.60	2.50
1976	13.50	8.00	6.30	2.40
1977	13.40	7.20	5.50	2.80
1978	12.10	5.90	4.30	2.20
1979	11.90	5.50	4.30	1.90
1980	12.80	6.90	5.00	1.80
1981	15.60	8.80	5.20	2.10
1982	19.40	11.30	7.50	3.20
1983	21.40	13.60	9.30	3.60
1984	17.60	9.40	5.70	2.80
1985	15.90	8.00	5.10	2.60

SOURCES: U.S. Department of Commerce, Bureau of the Census, Current Population Reports, Series P-60. U. S. Department of Labor, Bureau of Labor Statistics, Handbook of Labor Statistics, Bulletin 2217. 1984.

FIGURE 3

Unemployment Rates of Males, By Educational Attainment



SOURCE: Bureau of Labor Statistics, Handbook of Labor Statistics

high school diploma, and 8.0 percent of those with a high school education.

Education improves the quality of resources by instilling better working habits and efforts, greater discipline, and reliability; by promoting better health; by improving skills and efficiency; by enabling prompter adaptability to changes; and by increasing mobility. (Machlup 1970).

Education results in a more effective utilization of resources. Investment in education yields a return in the form of an increased rate of growth of national income.(Schultz 1961).

Contributions to Economic Growth

HUMAN CAPITAL FORMATION

Since the early 1960s, many research studies have attempted to isolate the reasons for economic development in the United States and in other countries. The seminal study of Edward Denison of the Brookings Institution identified six causes of American economic growth between 1929 and 1969. "Advances in knowledge" accounted for 31.1 percent of the increase while the "increased education of the work force" accounted for 14.1 percent. These two education-related factors alone accounted for almost one-half of the United States' increased productivity.

For example, in 1984-85, the educational institutions in the United States expended $244.4 billion on elementary, secondary, and postsecondary education. By Denison's calculations, education accounted for over $400 billion of the nation's total income of $3,774.7 billion that year. Advances in knowledge associated with education and research accounted for $866 billion more. Thus, the cost of education was only about 20 percent of the estimated productivity that was the result of education and research.

The development of skills and knowledge has been labelled by economists as "human capital formation." Human capital, like real estate and other assets, can be developed to yield a significant return on investment. Individuals have certain skills or capacities through which they earn a living. Higher education develops this capital by teaching facts, tools, and problem-solving techniques that increase the individual's capacity to earn. Higher education also can contribute to the individual's toleration for diversity, ability to handle ambiguity and cope with stress, and be a better leader. Each of these factors could enable a person to be a more productive worker and to contribute more to society.

INCREASED EARNINGS

Although there is considerable controversy about how higher education and earnings are linked, economists appear to agree that education is a sufficient condition for obtaining higher

paying jobs. Earnings of Americans increase as years of schooling increase. (See Tables 5 and 6 and Figure 4.) In 1982, a male with less than a grade school education earned $7,208 while a male with four years of college earned $24,630, over three times what his less educated counterpart could make. Similarly, over a lifetime, the earnings of male college graduates are estimated to be 1.44 times those of males without high school diplomas. Women college graduates are estimated to earn 1.51 times the lifetime amount earned by women without high school diplomas. (See Tables 7 and 8.) During a lifetime, a male with four years of college is expected to earn $1.4 million compared with $1.0 million for a male high school graduate.

Additional education generates additional income to the individual. As a result of the added income of the individual, higher education also benefits the government through increased taxes. Table 9 indicates how much more federal and State taxes Maryland college students with varying levels of higher education are likely to pay over their lifetimes than high school graduates, based on 1979 earning potential. Table 9 also shows how much the education cost the State of Maryland.

For example, men with bachelor's degrees are likely to pay $69,674 more in federal, State, and local income taxes over their lifetimes than high school graduates. These men are likely to pay an additional $18,428 in State and local income taxes. The cost of their education to the State of Maryland was only $11,287 based on FY 1985 costs. Women return somewhat less than men but

Table 5

Expected Lifetime Earnings by Gender and by Years of School Completed, 1979

	Men	Women
Less than 12 years of school	$ 845,000	$500,000
4 years of high school	1,041,000	634,000
1 to 3 years of college	1,155,000	716,000
4 years of college	1,392,000	846,000
5 or more years of college	1,503,000	955,000

SOURCE: Digest of Education Statistics, 1983-84, p. 192

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Table 6

Median Annual 1982 Income of Persons 25 Years Old and Over, by Years of Schooling Completed

	Men	Women
Less than 8 years	$ 7,218	$ 3,868
8 years	9,501	4,657
1-3 years of high school	12,079	4,930
4 years of high school	17,055	6,965
1-3 years of college	19,980	8,583
4 years of college	24,630	11,717
5 years or more of college	28,765	16,755

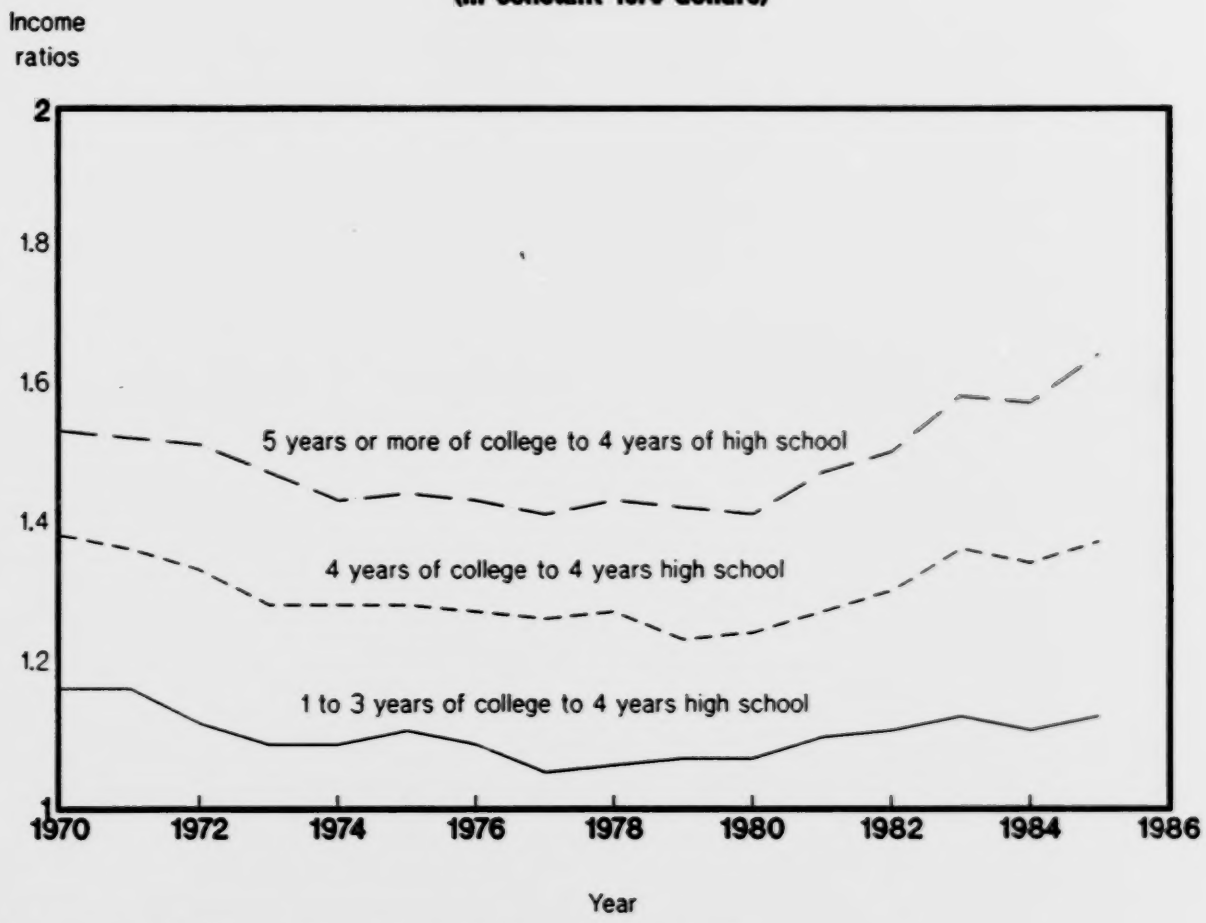
Source: Digest of Education Statistics, 1985-86, pp. 215-216.

01/21/87 table6(3)/mm

FIGURE 4

Income Ratios of Full–time Male Workers by Educational Attainment

(In constant 1970 dollars)



SOURCE: Bureau of the Census, Current Population Reports, Series P-60

Table 7

Lifetime Earning Differentials Based on Different Levels of Educational Attainment, 1979

	Men		Women	
	Amount	Percent Increase	Amount	Percent Increase
One-to-three years of college compared to a high school graduate	$114,000	11.0%	$ 82,000	12.9%
Four years of college compared to a high school graduate	$351,000	33.7%	$212,000	33.4%
Five or more years of college compared to a high school graduate	$462,000	44.4%	$321,000	50.6%
Four years of college compared to 3 or fewer years of college	$237,000	20.5%	$130,000	18.2%
Five or more years of college compared to three or fewer years	$348,000	30.1%	$239,000	33.4%
Five or more years of college compared to four years	$111,000	8.0%	$109,000	12.9%

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Table 8

Ratios of Income of Full-time Male Workers
By Educational Attainment, 1970 - 1985
(in constant 1970 dollars)

Year	1-3 years college to 4 years high school	four years college to 4 years high school	5 or more years of college to 4 years high school
1970	1.17	1.30	1.54
1971	1.17	1.37	1.53
1972	1.12	1.34	1.52
1973	1.09	1.29	1.48
1974	1.09	1.29	1.44
1975	1.11	1.29	1.45
1976	1.09	1.28	1.44
1977	1.05	1.27	1.42
1978	1.06	1.28	1.44
1979	1.07	1.24	1.43
1980	1.07	1.25	1.42
1981	1.10	1.28	1.48
1982	1.11	1.31	1.51
1983	1.13	1.37	1.59
1984	1.11	1.35	1.58
1985	1.13	1.38	1.65

SOURCES: U.S. Department of Commerce, Bureau of the Census, Current Population Reports, Series P-60.

Table 9

Costs of Instruction of Students at Various Levels and Estimated Extra Income Taxes Paid by Those Students During Their Lifetimes Above Those of High School Graduates

All Higher Education

Years of College Completed	Cost of Instruction To the State[1]	Extra Taxes[2] Men	Extra Taxes[2] Women
Three Years of College	$ 8,465		
Federal Income Taxes		$16,644	$11,972
State & Local Income Taxes[3]		5,985	4,305
Total Additional Income Taxes		$22,629	$16,277
Four Years of College	$11,287		
Federal Income Taxes		$51,246	$30,952
State & Local Income Taxes[3]		18,428	11,130
Total Additional Income Taxes		$69,674	$42,082
Five or More Years of College[4]	$15,520		
Federal Income Taxes		$67,452	$46,866
State & Local Income Taxes[3]		24,255	16,853
Total Additional Income Taxes		$91,707	$63,719

(1) Based on 1984-85 costs.
(2) All amounts are for extra taxes paid above those of high school graduates.
(3) Assumes no out-migration from the State.
(4) Based on one and one-half years of graduate study.

Note: Calculations based on average rates of Federal and State/local income taxes paid by Maryland residents. For FY 1985, State and local income taxes were 5.25 percent of adjusted gross income. Federal income taxes were estimated to be 14.6 percent of adjusted gross income. Estimation done by Policy Economics Group for the Department of Budget and Fiscal Planning. All figures are assumed to be in 1985 dollars.

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almost cover the costs of the education. In addition to income taxes, consumers also pay sales and other taxes to the State of Maryland. If these other taxes were counted, women with college degrees also would return more to the State than the cost of the education.

PROVISION OF A TRAINED LABOR FORCE

Students who graduate from colleges in Maryland are very likely to remain in Maryland after graduation. Only 9.5 percent of recent graduates obtained employment outside of the area. (See Figure 5.)

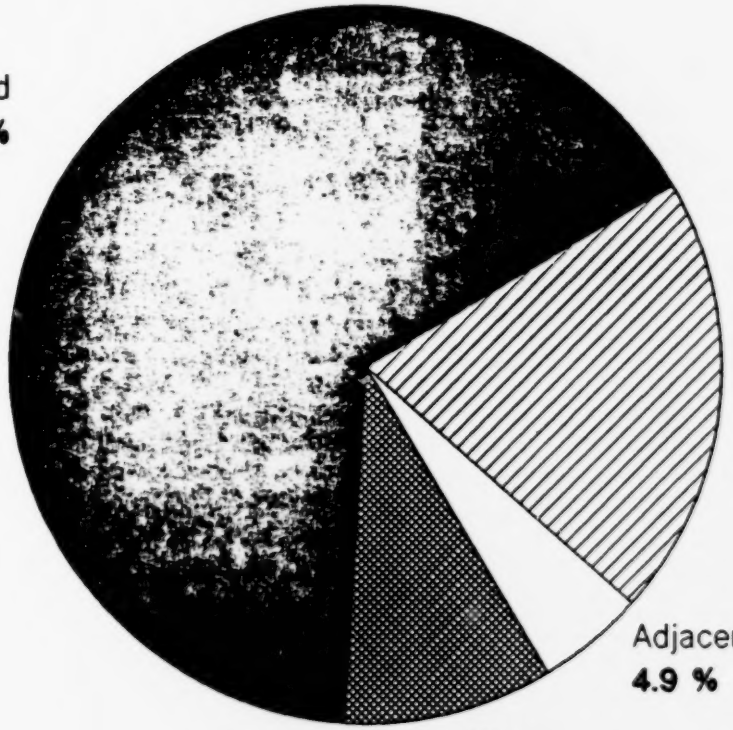
Colleges and universities are the major source of human capital development for highly skilled occupations and the professional fields. These professions and skilled occupations comprise a majority of the American workforce. In fact, those occupations requiring a bachelor's or higher degree are growing faster than occupations that do not require postsecondary training. The U.S. Department of Labor has indicated that "Although employment is growing in virtually all sectors of the economy, growth has been much more rapid in service-producing industries than in goods-producing industries." (Personick 1982).

"Service-producing industries" include business, health and medical care, personal services like legal and financial agencies, communications, and repair services. Since 1960, these industries have employed an increasing share of the U.S. labor

FIGURE 5

Places of Employment of Recent Graduates

Maryland Public Baccalaureate Recipients



force, and have accounted for approximately two-thirds of the growth in employment in the nation. In addition, service-producing industries employ the most college and university graduates.

The U. S. Department of Labor has predicted that the occupations that will have the fastest employment growth before 1990 generally are those that require some postsecondary education. The 30 occupations slated to grow the fastest through 1990, including the level of education normally required for the occupation, are shown in Table 10. Only two occupations among the 30, food preparation and service workers and child care attendants, do not require any postsecondary education. Of the remaining, 12 require a bachelor's or higher degree, and the rest require some postsecondary training.

In Maryland, the Department of State Planning has projected that between 1980 and 1990, the service industries are likely to grow the most, followed by finance, insurance, and real estate and trade. The same general patterns also are projected through 2005. (See Table 11.)

By 1990, the service-related industries are expected to surpass government in their share of total Maryland employment, according to Department of State Planning projections. Between 1980 and 1990 the greatest growth among the job categories listed by State Planning will occur in air transportation (70.8 percent); transportation (52.9 percent); personal and business

TABLE 10

Number of Jobs and Rates of Growth for the 30 Fastest Growing Occupations in the United States, 1978-1990

Code*	Occupation	Number of Jobs (in thousands) 1978	1990	Percent Change
2	Data Processing Machine Mechanics	63	156	147.6%
2	Paralegal Personnel	28	66	135.7
3	Computer Systems Analysts	185	384	107.6
2	Computer Operators	169	317	87.6
2	Office Machine and Cash Register Servicers	49	89	81.6
3	Computer Programmers	204	354	73.5
3	Aero-Astronautical Engineers	57	98	71.9
1	Food Preparation and Service Workers, Fast Food Restaurants	714	1,206	68.9
2	Employment Interviewers	51	86	68.6
2	Tax Preparers	29	47	62.1
3	Architects	66	106	60.6
2	Correction Officials and Jailers	95	152	60.0
2	Dental Hygienists	53	84	57.9
2	Physical Therapists	31	49	57.6
2	Dental Assistants	123	193	57.5
2	Peripheral EDP Equipment Operators	46	72	57.3
1	Child Care Attendants	35	55	56.3
3	Veterinarians	30	47	56.1
2	Travel Agents and Accommodations Appraisers	45	70	55.6
2	Nurses Aides and Orderlies	1,089	1,683	54.6
3	Speech and Hearing Clinicians	34	52	54.5
3	Economists	27	41	54.2
2	Real Estate Agents and Representatives	255	394	54.1
3	Geologists	33	50	52.1
3	Insurance Claims Examiners	38	58	51.5
3	Electrical Engineers	291	441	51.2
2	Welfare Service Aides	84	126	51.1
3	Professional Nurses	1,026	1,542	50.3
3	Dieticians	41	61	49.7
2	Psychiatric Aides	77	115	49.5

*Codes: 1. No postsecondary education normally required.
2. Some postsecondary education normally required.
3. Baccalaureate degree or higher normally required.

Source: U.S. Department of Labor, 1982

Table 11

Growth of Maryland Jobs by Place of Work

Industry	Percent Growth 1980 to 1990	Percent Growth 1980 to 2000	Percentage Share of Total 1980	Percentage Share of Total 1990	Percentage Share of Total 2000
Services	37.6%	56.3%	22.2%	26.6%	27.7%
Finance Insurance and Real Estate	24.5%	36.5%	5.2%	5.7%	5.7%
Trade	23.8%	36.8%	21.7%	23.4%	23.6%
Construction	14.4%	24.3%	6.1%	6.1%	6.0%
Transportation, Communications, Utilities	13.9%	29.9%	4.7%	4.6%	4.8%
Agriculture and Fisheries	12.1%	19.5%	2.7%	2.1%	2.1%
Government	(3.5%)	1.1%	25.7%	21.6%	20.7%
Mining	(4.8%)	0.0%	0.1%	0.1%	0.1%
Manufacturing	(7.8%)	(5.0%)	12.2%	9.8%	9.3%

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services (51.2 percent); credit services (45.0 percent); professional services (38.8 percent); non-profit services (38.0 percent); and medical services (37.1 percent). The majority of the jobs in these areas will require at least some postsecondary education, and many will require at least a bachelor's degree.

The presence of higher education institutions attracts industries to a location. Among the factors that influence the regional choices of high technology companies, the presence of academic institutions was related as an important factor by 59 percent of the companies, and ranked fourth among all the factors. Ranked first was labor skills/available. (See Table 12.)

Within the mideast region, however, about 80 percent of high technology companies rated as important the presence of academic institutions. Academic presence was the most important factor in site location for high technology companies in the mideast. (See Table 13.)

TABLE 12

Factors That Influence Regional Choices of High-Technology Companies

Rank	Attribute	Percent Rating Factor As Important
1	Labor Skills/Availability	89.3
2	Labor Costs	72.2
3	Tax Climate Within the Region	67.2
4	Academic Institutions	58.7
5	Cost of Living	58.5
6	Transportation	58.4
7	Access to Markets	58.1
8	Regional Regulatory Practices	49.0
9	Energy Costs/Availability	41.4
10	Cultural Amenities	36.8
11	Climate	35.8
12	Access to Raw Materials	27.6

Source: Joint Economic Committee, U.S. Congress

TABLE 13

Regional Ratings of High Tech Companies

Rank	Attribute	New Eng.	Far West	Mid-East	South-east	South-west	Mt. & Plain	Mid-west
1 & 2	Labor Cost/Availability	36.3	32.4	34.6	75.2	68.5	53.2	43.0
1 & 2	Labor Productivity	49.2	53.7	41.8	54.6	63.1	63.2	53.7
3	Tax Climate Within the Region	8.0	22.8	17.3	91.2	86.3	68.7	31.5
4	Academic Institutions	96.6	93.0	79.9	28.9	41.3	27.2	68.0
5	Cost of Living	13.2	9.0	22.9	90.6	76.2	72.2	49.6
6	Transportation	70.7	69.9	73.8	43.0	48.4	31.7	66.0
7	Access to Market	76.5	81.5	76.1	42.3	53.2	30.6	62.7
8	Regional Regulatory Practices	16.0	27.1	25.1	72.9	71.7	56.9	35.2
9	Energy Costs/Availability	10.5	46.0	21.1	74.8	70.7	49.3	29.9
10	Cultural Amenities	90.9	87.1	75.2	18.8	31.0	20.3	41.9
11	Climate	21.4	93.2	20.8	62.1	82.7	50.5	11.6
12	Access to Raw Materials	64.0	71.3	64.6	41.1	51.9	37.9	61.9

Source: Joint Economic Committee, U.S. Congress.

SUMMARY AND CONCLUSIONS

Higher education has short-term and long-term impacts on the economy of the State of Maryland and provides social returns to the State. The directly measurable influences of the institutions of higher education as industries are massive, contributing at least $3.776 billion to Maryland's economy in FY 1985, an amount that represents about 6 percent of the gross state product.

The functions of institutions of higher education as trainers of highly skilled talent, producers of new knowledge, and contributors to Maryland's cultural life can be measured only indirectly and estimated. However, the conclusion is inescapable that higher education's intangible benefits are even more important economically than the measurable monetary benefits.

Maryland's economy cannot function without highly trained persons and without continued technological innovations. Higher education is a major source of the talent and innovation needed by those industries that are growing most rapidly in Maryland. At the same time, Maryland's colleges and universities cannot function without a strong economy to support and provide the resources needed for research, instruction, and public service. Thus, higher education must work with businesses and industries

in Maryland, and in the surrounding areas, to develop mutually beneficial programs that will sustain and encourage economic growth and continued benefits for the State's citizens.

Higher education develops individuals that are better leaders, more able to handle ambiguity and stress, more tolerant of diversity, more adaptable to change, have better work habits, are more reliable, and more aware of social responsibilities. Individuals who complete postsecondary education have lower rates of unemployment, and are less likely to commit crimes. Lifetime earnings of individuals who have attended institutions of higher education tend to be higher than those of less educated individuals. Thus, individuals who have had the benefits of higher education return to the State the cost of their education in increased taxes.

The institutions of higher education engage in many research activities that pay large economic dividends by attracting and keeping diverse industries in the State. Industrial researchers have been trained by universities at which they were exposed to basic research problems and faculty with broad experiences who enabled the development and refinement of research skills. Basic research from colleges and universities led to the discovery of DNA and RNA, and in turn led to the development of many beneficial pharmaceuticals. In the social sciences, natural sciences, and the humanities, basic research conducted at colleges and universities has resulted in a better understanding of human beings and the world. Maryland's attractiveness to high

tech industries can be attributed in great part to the availability of highly trained individuals and of nearby university research facilities.

Howard Bowen summarized the benefits of higher education this way: "First, the monetary returns from higher education alone are probably sufficient to offset all the costs. Second, the nonmonetary returns are several times as valuable as the monetary returns. And third, the total returns from higher education in all its aspects exceed the cost by several times. In short, the cumulative evidence leaves no doubt that American higher education is well worth what it costs." (Bowen 1977).

A strong relationship exists between economic prosperity and educational expenditures. Resources devoted to the institutions of higher education in Maryland over the last 200 hundred years have paid enormous dividends to the State of Maryland and its citizens. Investments in higher education are a large part of the reasons why Maryland has a productive and growing economy.

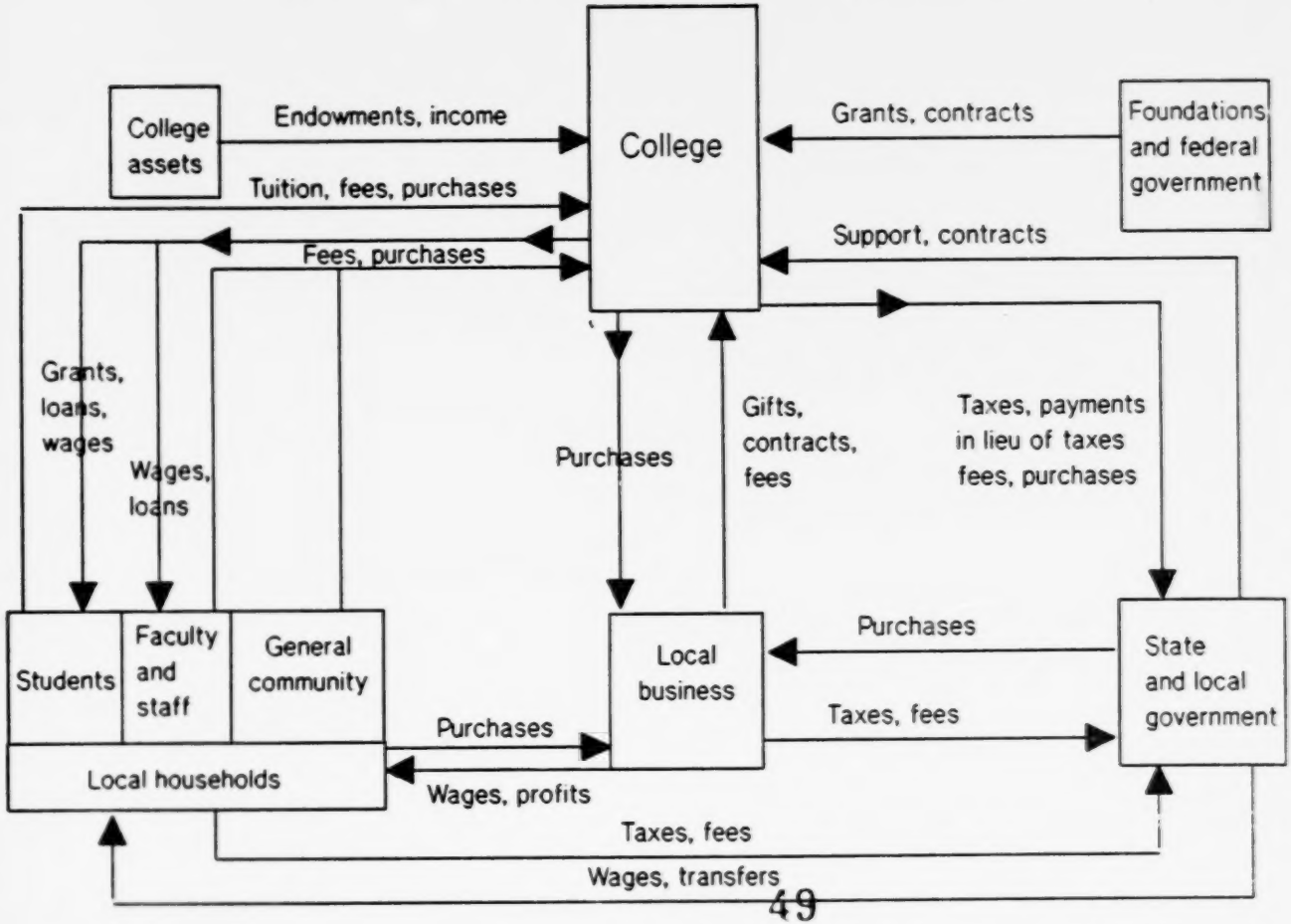
APPENDIX A

THE DERIVATION OF AN ECONOMIC IMPACT MODEL

To estimate economic impact, Caffrey and Isaacs examined the services offered by a college to its students, faculty and staff, visitors, and members of the community. As a corporation, the college spends; faculty, staff, students, and visitors also contribute to the local economy by purchasing goods and services. Some of the services and goods offered by the college are "sold" in direct competition to similar goods and services offered in and by the community, and consequently reduce business opportunities for local investors. The economic relationships between a college and the surrounding community are shown in Figure A-1. The ideas displayed in Figure A-1 can be shown as a cash-flow transactions matrix, and are pictured in Figure A-2.

By measuring cash flow in each cell of the matrix shown in Figure A-2, and by applying economic multipliers, Caffrey and Isaacs were able to calculate an economic impact figure, that is, the amount of money that would not be in a state or locality if a campus was not located there. In Figure A-2 cash flows from the units listed at the left to the units shown across the top. Transactions between sectors are not shown. The cash-flow relationships shown in Figure A-2 imply that economic impacts also exist for the capital facilities associated with the college or university. College facilities must be operated, maintained,

FIGURE A–1
AN EXTENDED CASH FLOW MODEL



SOURCE: Caffrey and Isaacs, p. 7.

FIGURE A–2
AN EXTENDED CASH–FLOW OR TRANSACTIONS TABLE

TO / FROM	COLLEGE	BUSINESS	GOVERNMENT	HOUSEHOLDS		
				Students	Faculty, staff	General community
College		Purchases	Taxes, in–lieu, fees, purchases	Stipends, grants, loans, wages	Wages, loans	
Business	Gifts, contracts, fees, endowments, income		Taxes, fees	Wages, profits	Wages, profits	Wages, profits
Government	Support, contracts	Purchases		Wages, transfers	Wages, transfers	Wages, transfers
Households: Students	Tuition, purchases	Purchases	Taxes, fees			
Faculty, staff	Fees, purchases	Purchases	Taxes, fees			
General community	Fees, purchases	Purchases	Taxes, fees			

SOURCE: Caffrey and Isaacs, p. 8.

and protected; all of these are activities that create local business investment in facilities and inventories and local government investment in fire and police protection, sanitation, transportation, public works, and similar services.

The physical assets of students consist primarily of automobiles, and to a lesser extent of residences. Like the college physical assets, the students' assets affect the level of investment by local businesses and government dealing in operation, maintenance, protection, streets, parking facilities, and police. Faculty and staff assets include automobiles and real estate. The operation, maintenance, and protection of these assets has the same effect on local businesses and government as do the assets of the college, although their impact is more likely to be local than is that of the college. Increases in the assets of the college or university, its students, and its faculty and staff induce the community to make additional investments. The likelihood of receiving grants also induces local businesses to increase or maintain their levels of capital investment, which in turn, creates demands for more loanable funds (Caffrey and Isaacs 1971).

The base for the economic impacts is a factor known as the "expenditure multiplier." The concept of the expenditure multiplier is based on the economic principle of exchange, which holds that when money is spent for some purpose, it does not simply disappear. Part of the money remains in the community to

be spent and spent again. The portion of the money that is removed from the immediate area may leave in the form of taxes, purchases outside the area, or by any of a number of other means. However, in most cases, several exchanges of money are involved before it vanishes from the local area. For example, if half of a dollar leaves the community in the first transaction, and half at each following transaction, seven transactions will take place before the value drops below one cent. All of these transactions taken together will generate another dollar of economic activity in the community. This 50 percent "retention rate" produces an expenditure multiplier of 2.00 - each dollar spent generates another dollar to be spent in the community. (CPEC, p. 4.)

Table A-1 and Figure A-3 show the impact of the various retention rates on multiplier levels. The range of multipliers is from 1.0 with 0.0 percent retention when the dollar is spent totally outside of the community, to infinity, when the dollar spent never leaves the community. The larger or more self-contained the area in which the money is spent, the greater will be the per cent retained, and consequently, the greater the multiplier will be. A dollar spent in the United States has a very large multiplier because the country is so large; similarly the multiplier for Rhode Island would be smaller, since the state is geographically small. Clearly, the definition of the area involved is extremely important.

TABLE A-1

Relationship Between the Percentage of an Extended Dollar Remaining in the Economy After Each Financial Transaction and the Resulting Economic Multiplier

Percentage of Each Expended Dollar Remaining in the Economy	Economic Multiplier
0.0%	1.00
10.0	1.11
20.0	1.25
30.0	1.43
40.0	1.67
50.0	2.00
60.0	2.50
70.0	3.33
80.0	5.00
90.0	10.00
100.0	Infinite

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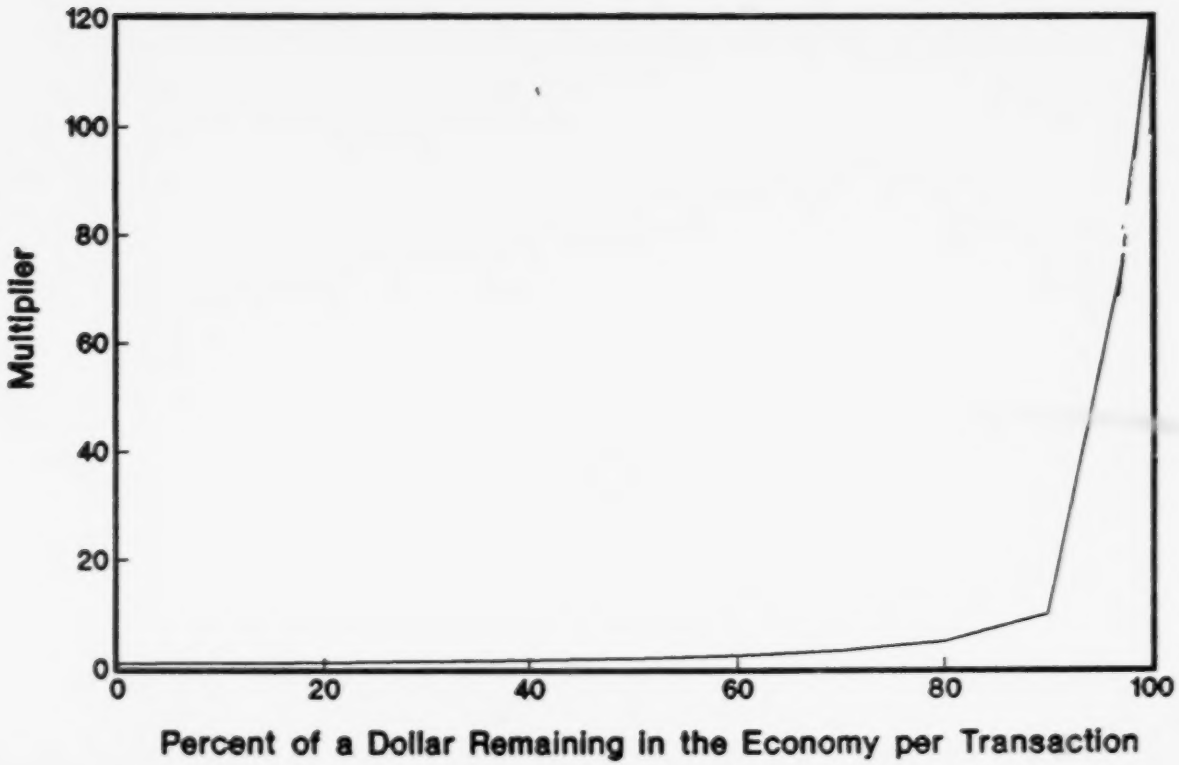
FIGURE A-3

Relationship Between the Percentage of an Expended Dollar Remaining in the Economy after Each Financial Transaction and the Resulting Economic Multiplier



SOURCE: California Postsecondary Education Commission, p. 5.

APPENDIX B

Table 2

Institutions Included in Study

Public Institutions

Four-Year:

Bowie State College
Coppin State College
Frostburg State College
Morgan State University
St. Mary's College of Maryland
Salisbury State College
Towson State University
University of Baltimore
University of Maryland:
  Agriculture Experiment Station
  Baltimore City
  Baltimore County
  Center for Environmental and Estuarine Studies
  Central Administration
  College Park
  Cooperative Extension Service
  Eastern Shore
  University College

Two-Year:

Allegany Community College
Anne Arundel Community College
Catonsville Community College
Cecil Community College
Charles County Community College
Chesapeake College
Community College of Baltimore
Dundalk Community College
Essex Community College
Frederick Community College
Garrett Community College
Hagerstown Junior College
Harford Community College
Howard Community College
Montgomery College
Prince George's Community College
Wor-Wic Tech Community College

Independent Institutions:

Baltimore Hebrew College
Capitol Institute of Technology
Columbia Union College
Eastern Christian College
Goucher College
Hagerstown Business College
Hood College
The Johns Hopkins University
Loyola College of Maryland
Maryland College of Art and Design
Maryland Institute, College of Art
Mount St. Mary's College
College of Notre Dame of Maryland
Peabody Institute
St. John's College
St. Mary's Seminary
Sojourner-Douglass College
Villa Julie College
Washington Bible College
Washington College
Washington Theological Union
Western Maryland College

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